



**High Performance Computing Software**

*JPL Internal Seminar Series*

# **The GeoFEST Finite Element System for Faulted Crustal Deformation**

by

**Jay Parker and Greg Lyzenga**

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**12:00 noon – 1:00 p.m.**

**Building 126, Room 112**

The finite element technique offers nearly the greatest generality in modeling heterogeneous faulted regions of the earth's crust (e.g, Los Angeles). GeoFEST is an MPI-parallel code which has demonstrated 500-year simulations of postseismic Southern California deformation processes including multiple interacting faults, using 1.4 million finite elements, half-year time steps, using up to 128 processors of a Linux cluster. Wallclock times are typically a few hours.

GeoFEST has been integrated into the QuakeSim portal, which offers users an integrated web services environment that includes a database of California earthquake fault geometry, a geometry construction tool, mesh generation, PYRAMID adaptive mesh improvement, and visualization of results using RIVA and PARVOX. Problems can be specified and solved by non-experts through the web portal, and the resulting deformation can be displayed in combination with Landsat imagery and a digital elevation model.

GeoFEST is designed to aid in interpretation of GPS, InSAR and other geodetic techniques, some of which are undergoing an exponential increase in volume due to NASA remote sensing and satellite geodesy programs. Simulations are planned that will use a 16 million element model of the Los Angeles basin to find a physical basis for the observed localized compression of the northern portion of the basin.